White's Ferry Bridge
(Buckeye Bridge)
Carrying Township Road 209
Over the Spoon River
Blyton vicinity
Cass Township
Fulton County
Illinois

HAER No. IL-119

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Rocky Mountain Regional Office
Department of the Interior
P.O. Box 25287
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HISTORIC AMERICAN ENGINEERING RECORD

WHITE'S FERRY BRIDGE

(BUCKEYE BRIDGE)

HAER No. IL-119

I. INTRODUCTION

Present Location:	Cass Township Road 209 Spanning Spoon River Buckeye Settlement, Illinois
USGS Quadrangle:	Blyton, 7.5. Latitude 40°-31.8'; Longitude 90°-18.2' UTM: 16.727789.4490038
Inventory Data:	Cass Township Road District Township Road 209 2 mi S and 2 mi W of Blyton Structure No. 029-3096 NE 1/4 of Sec 6, T6N, R2E Fulton County
Date of Construction:	1910
Owner, Custodian:	Cass Township
Present Use:	Vehicular bridge, programmed for replacement. Projected date of removal is FY 1994.
Significance:	The White's Ferry or Buckeye Bridge is a three span, steel structure with a pin-connected, Parker Through truss as the main span. A representative example of early development of steel truss bridge construction in Illinois, the White's Ferry Bridge is one of only six pin-connected highway bridges of this truss type in the state. Its listing on the National Register of Historic Places is part of a thematic historic district that demonstrates truss bridge development within the scenic Spoon River Valley, a relatively concentrated and easily definable rural area.
Historian:	John B. Nolan, S.E. May 12, 1994

II. HISTORY

The Spoon River of West Central Illinois, about eighty miles long, flows southerly through rolling terrain, generally parallel with and twenty-five miles west of the Illinois River. The earliest recorded Euro-Americans arrived in the valley in the late 1820s. "Early settlers were woodsmen, not traders, and their equipment was limited to a few basic tools . . . and lastly - a wife. After the Black Hawk War in 1832 some fifteen families moved into the area known as Cass Township. By the early 1840s, a pattern of neighborhoods and schools began to show." The Buckeye neighborhood was named for the school, first built of buckeye logs from the Spoon valley bottom lands. The school was also used as a church until a new building, correctly the Mount Pleasant Christian Church but better known as the Buckeye Church, was built in 1868. The church has been carefully preserved. The school was later replaced with a brick building which has since been removed.[1]

The tiny Buckeye community failed to develop as a trading center. An atlas map published in 1871 shows Buckeye Church and School and early trails from more popular Canton, Fulton County seat, on the east, Bushnell on the west, and Smithfield and Bernadotte on the south. These roads met at the nearby river bank where sloping access and a gravel bottom provided a ford across the Spoon River and access to markets in western counties.[2]

In 1895, the county commissioned John Jennings, a Buckeye resident and accomplished blacksmith, a builder of patented overhead lever gate-opening devices, to build a ferry. Jennings built the ferry, painted it white and named it the White Swan.

Powered by the current and utilizing block and pulley connections to an upstream cable, the White Swan was operated by T. C. "Tab" Carver, who was paid $50 a year by the township. In the grove of trees at the ferry landing on the east (Buckeye) bank, Tab built a little store on stilts and stocked it with a few staples and "pop." Here ferry users, fishermen, musselmen and others gathered to play horseshoes and spin yarns. Residents of the community referred to Carver's establishment as "Tab's Store" or "Liarsville."[3]

During its fifteen years of operation, the White Swan ferry became known as White's Ferry. Mrs. Ella Bolon remembers the fare as twenty-five cents.

The bridge letting contract was approved in September 1909 and construction completed in 1910. The year of building is remembered for the death of young Joe Foot, 19 years old with bushy black hair, who fell from the scaffold while placing a top chord of the bridge, dying instantly when he struck a bridge member in his fall to the river. Mrs.

Bolon, four years old at the time, watched her mother helping the undertaker and remembered worrying that Joe's legs had to be bent to fit into the coffin. "Oh, he can't rest like that," she told her mother.[4]

When the state and county marked through routes and began improvements after the 1920s, more direct routes were opened to connect surrounding larger communities, bypassing Buckeye and White's Ferry Bridge.[5] Present bridge use is limited to providing access to fields in the bottom land west of the river.

During eighty-three years of existence, the White's Ferry Bridge, often called the Buckeye Bridge, has been adequately maintained and rehabilitated as needed. Although lightly rusted, the bridge is much cleaner than the majority of bridges of this age. The posted load capacity is 6 tons for a single vehicle and 11 tons for a combination, tractor-trailer, loading. Average daily traffic is estimated as two vehicles per day. Under normal conditions, the water surface is about 19'-6" below the deck. During floods the water has been 2" over the east end of the deck.

On two weekends each fall, hundreds of visitors drive through the area for Spoon River Days, a popular opportunity to view fall color, visit craft displays and eat country cooking. Although the guide book calls attention to the Buckeye Church and Cemetery, Joe Foot's grave and White's Ferry iron bridge, few tourists travel the two miles from the Smithfield-Blyton county highway to visit these relics.[6]

III. THE BRIDGE

A. The Bridge Type

The White's Ferry Bridge incorporates three spans. The two multi-beam approach spans have no historical significance. The center main span is a through Parker truss. A Parker truss is a basic Pratt truss improved with inclined upper chords.

When early railroad bridge builders required heavier and more stable trusses, Caleb Pratt and his son, Thomas, developed and patented the Pratt Truss in 1844. Originally Pratt's trusses were developed for wood but were soon readily adapted to wrought iron and later, after the 1890s, to steel as that material became more readily available. Utilizing vertical columns and a top chord in compression, eyebars for lower chord and principal diagonal tension members, with counter rods, often with turnbuckles or threaded ends to tighten the system, Pratts were one of the most widely used metal trusses into the early twentieth century.[7]

Pin-connected Pratts with parallel upper and lower chords were

an American phenomenon, readily adaptable to shop fabrication, dismantlement for shipment and simple reassembly at the site. Construction was frequently by inexperienced crews working under a superintendent furnished by the manufacturer. Iron trusses with pinned connections were universally accepted in the United States, but rarely used elsewhere.[8]

In the final decade of the 19th century, as design expertise and assembly techniques improved, the substitution of inclined polygonal top chords in the Pratt permitted designers to adjust the depth differentially within the truss, allowing top and bottom chords to be further apart at the bridge center where required and reducing depth near the ends where strength needs decrease. In the improved configuration, a Parker Truss, the variable depth ability conserves metal and reduces bridge weight which can be spread or traded off for a larger span. In the twentieth century preferences shifted quickly to Parker through trusses for spans of over 150'. Parkers became of age as rivets were replacing pinned connections.[9]

The Illinois Historic Bridge Survey inventory includes six pin-connected through Parkers built between 1898 and 1917, with span lengths varying between 156' and 200'. Three later Parkers with riveted connections are dated 1930 to 1940. The maximum Pratt truss length listed in the Historic Bridge Survey is 122'.[10]

B. The Builder

1. The Springfield Bridge and Iron Company

The earliest record of the Springfield Bridge and Iron Co. appears in 1895 when Joseph E. Burtle, a self taught surveyor and civil engineer from Pawnee, Illinois, joined his brother Jerome to organize and incorporate the company. Advertised as Bridge Builders and Structural Iron Manufacturers, Joseph was president and Jerome secretary.[11]

While continuing their contracting business, the brothers built a plant in 1899 for the manufacture of structural steel. The facility, located in Springfield between ninth and tenth streets on the north side of Cook, was reported to be equipped with the most modern machinery for facilitating bridge work. Also mentioned was a foundry employing about 40 men continuously during the year. The company operated throughout the state, doing much of the bridge work in Sangamon County and frames for several large buildings in Springfield.[12]

In 1906 Jerome Burtle succeeded his brother as president of the company, Thomas J. Fullenwider and later S. J. Willet serving

as secretary-treasurers. Joseph E. Burtle was listed as a structural engineer that year but in later years appears either as a foreman or iron worker until 1911, when he is shown as a civil engineer or contractor, continuing through 1913, his final listing. A brief obituary in 1917 reports his funeral at the home of his brother Jerome.[13]

The Cook Street plant was closed and dismantled in 1913. There is no record of bankruptcy. As a contractor, Jerome Burtle continued to erect steel structures as Jerome Burtle and Company, or the Burtle Construction Company until his death in 1924. His passing was noted in a half-column news item.[14]

2. The Springfield Bridge and Iron Company in Fulton County

In September 1909, The Fulton County Board of Supervisors accepted the report for letting a contract for building the White's Ferry Bridge to the Springfield Bridge and Iron Company at a cost of $4500, the bridge to be completed by December 1.[15] No further mention of the bridge is found in subsequent newspaper reports of the Supervisors' meetings. Seville Bridge, a duplicate of White's Ferry, was mentioned later without identifying a builder.[16] As another example of the company's activities, in January 1910 the Supervisors awarded a contract to Springfield Bridge and Iron Company for building a bridge over Otter Creek. The range of bids for this 70' bridge with a 12' roadway, was between $1480 and $1550.[17]

There is no name plate on the bridge. By local oral tradition, the bridge builder was an Ohio Company, the same builder who constructed the similar bridge at Seville in 1917.[18] It is possible, but cannot be verified, that the steel members were fabricated by others.

C. Structure Description

For drawings showing truss member nomenclature and Parker truss details, see Appendix, pages 16 and 17.

Three spans, total length 217'-0"

1. East approach span: approximately 20'-0" long; nine steel stringers at 2'-0" centers, seven interior 7I40, two outer channels; fair condition, no historical significance.

2. Center span, Through Parker truss; length 180'-0", ten panels approximately 18'-0". Center to center of trusses 18'-6"; clear width between railings 15'-8"; clear height above the roadway at portal 13'-11".

   Height of interior posts vary, dimensions between pin centers of lower chord and polygonal upper chord are approximately:

L1-U1	19'-4"	L2-U-2	22'-6"
L3-U3	24'-10"	L4-U4	26'-0'
L5-U5	26'-6"		

   Truss member details are symmetrical about L5-U5:

   Inclined end posts and upper chords:
   Two channels 10"x2-1/2" with continuous top plate 15"x1/4'; bottom lacing 1-3/4"x3/16" @ 15" centers, rivets 3/4" @ 4-1/2".

   Lower chords:

L0-L1, L1-L2	two eyebars 3"x7/8"
L2-L3, L3-L4, L4-L4	two eyebars 4"x1-1/4"

   Vertical Posts U1-L1 through U5-L5:
   Two channels 6"x1" (channel webs perpendicular to bridge centerline, unusual), toes out, 4" back to back, lacing 1-1/4"x3/16" @ 15" centers.

   Diagonals and counters:

U1-L2	two eyebars 2-1/2"x3/4"
U2-L3	two eyebars 2"x5/8"
U3-L4	two eyebars 2"x1/2"
L3-U4*, U4-L5, L4-U5*	two bars 7/8" square, *upset threads 1-1/4" dia., 9" turnbuckle.

Floor Beams:
L0, L10, I-beams 15"x5-1/2"
Interior, I-beams 15-1/2"x6"
Paired connection angles on ends, 4 rivets; ten 1/2" bolts to post end plates; floor beams are above lower chords, distance top floor beam to lower chord pin centers 2'-4".

Bottom lateral cross-bracing: rods 1-1/4" dia through floor beams to skewback clips, upset threads 1-3/4" dia.

Stringers (joists): seven 7I40 interior, two edge channels.

Pins: all connections, 2" dia.

Rivets: 3/4" dia. main members

Top lateral struts: two paired angles 2-1/2"x2-1/2"x1/4" with interior 1/4" connection plates; bolted to top of upper chords at panel points U2 through U8.

Sway struts: paired angles and connection plates similar to top lateral struts; bolted to vertical posts 2 through 8 with paired clip angles 4"x3"x1/4".

Sway bracing: cross-bracing between above struts, single angles 2-1/2"x2-1/2"x1/4" (approx.), similar angle vertically through center connection plate; frame depth varies from approximately 4'-11" to 8'-11" at center due to increase in vertical post heights.

Top lateral cross bracing in interior panels between U1 and U9: rods 1" (approx.); ends threaded and tensioned through U-castings bolted on top of upper chords at panel points.

Portal frames: paired angles, 3"x3"x3/8" top and bottom, single angle 2"x2"x1/4" diagonal cross bracing to quarter points, connection plates bolted to end post, frame depth 3'-0" (approx); decorative knee brace angles 2"x2"x1/4", curved 90 degrees to a 3'-6" radius with a similar angle brace on arc external for stiffening.

Truss bearings:
East, fixed: each side two pin plates 5/8" and angle 3-1/2"x5"x3/8", base plate, 1/2" x 15"(width) x 18" (length); short paired clip angles with bolts secure base plate to top of tube plate.

West, expansion: pin plates as on east bearings, each bearing on four 2" dia. x 17" solid steel rollers; bearings expanded 7", spread by flaked pack rust and inoperable.

3. West Approach Span: approximately 16'-0" long; nine steel stringers at 2'-0" centers, seven interior 7I40; two outer channels; fair condition, no historical significance.

Bridge railings on each side consist of two channels 4"x1-1/2", legs to traffic, 1'-11" and 3'-8-1/2" above the deck surface.

Bridge deck consists of 3"x10" (nominal) transverse creosoted timber planking, 16'-0" long, installed in 1961.

The design loading of the truss is not known. Member fabrication and connection details are generally standard and simple, an indication of experienced detailing and classic state-of-the-art economy of material. All members appear to be carbon steel with a probable unit design stress of 12,500 psi.

5. Substructure:

Each truss bearing is supported on a concrete filled caisson, a riveted tube 3'-8-1/2" in diameter, fabricated from 1/4" bent plates, riveted and capped with a 3/8" top plate 4'-6" in diameter. The two tubes supporting each end are joined with two horizontal struts at approximate 10'-0" centers. Struts consist of two channels 6"x1-1/2", with top and bottom lacing. Cross-bracing rods between struts are 1-1/4" with turnbuckles.

Abutment face walls consist of nine beams 6"x3-1/4" driven vertically at 2'-0" centers, enclosing eight unreinforced concrete panels. All wingwalls are approximately 15'-0" long and tapered about 75° to the abutment face. East wings support a steep earth approach fill and consist of five unreinforced concrete panels between beams 6"x3-1/4", capped with a channel 6"x2", wing beams are tied to opposite wings with 7/8" rods; concrete wing panels are broken and failing. West wings, located on a higher stream bank and levee berm, are concrete gravity walls 1'-2" thick on top.

D. Present Condition And Modification:

Lower chords at pin connections were rehabilitated and strengthened about 1978 when the county welded plates between eye-bar webs at connections. Bridge members are rusty but show little deterioration. There is no evidence of modification or repairs to other truss members. Members and connections are in fair to good condition. The bridge is posted for six tons for single vehicles and eleven tons for combination loads. This low rating is probably due to the lightness of the original components, not to deterioration. No significant distress was noted in the substructure.

E. Ownership and Future

White's Ferry Bridge is owned and maintained by Cass Township. Due to the narrow roadway and low load carrying capacity, Fulton County is currently planning to replace this structure. Although the bridge, because of age and configuration, is of more than usual structural interest, its location and size make preservation for recreational or historic purposes an unlikely alternative.

IV. ENDNOTES

[1]Helen Hollandsworth Clark, ed., A History of Fulton Co., Illinois in Spoon River Country, 1818-1968 (Astoria, Illinois: Stevens Publishing Co., 1969), 111ff.

[2]Atlas Map of Fulton Co., (Davenport, Iowa: Andreas, Lyter & Co., 1871).

[3]Conversations and correspondence: Robert Ford, Buckeye resident and historian, June 18, 1993; Ella Bolon, former Buckeye resident, June 18, 1993; Helen Wright, Fulton County Ferry historian, August 11, 1993 with attachment: Curtis Strode, "The Ferry on the Spoon", Fulton County Record Book.

[4]Bolon.

[5]Map Showing Marked Through Routes In Illinois, Illinois State Highway Department, 1 February 1917; Map Showing Construction Progress On Federal Aid and State Bond Issue Routes, Division of Highways, Bureau of Design, December 31, 1923.

[6]Publications Committee of the Spoon River Scenic Drive Associates, Ramblin Thru Spoon River Country, (Canton Daily Ledger: 1969), 10ff.

[7]David H. Miars, A Century of Bridges (Clinton Co. [Ohio] Historical Society, 1972), 3; David Plowden, Bridges: The Spans of North America (New York: Viking Press, 1974), 65.

[8]Plowden, op. cit., 62, 67.

[9]James L. Cooper, Iron Monuments to Distant Posterity, Indiana's Metal Bridges, 1870-1930. (DePauw University, FHWA, Indiana Department of Highways and others, 1987), 70, 76.

[10]Illinois Department of Transportation, Historic Bridge Survey. (Springfield, Illinois: Bureau of Design and Environment, 1992), 3101m.pk, 3103m.pk.

[11]Lewistown Evening Record (Lewistown, Illinois); September 17, 1909, 4.

[12]_____, December 17, 1909, 2.

[13]_____, January 27, 1910, 4.

[14]Ford, June 18, 1993. Additional sources searched for builder: Conversations with Bolon; Bob Helle for Robert E. Pedigo, Fulton County Engineer Engineer; Mary Ruth Wright, Cass County Supervisor; Marjorie Bordner, Fulton County Historical Society; and Joe Helle, local historian. (Wright, who is organizing Cass Township records, states that many records are fragmentary, or have been lost or burned).

[15]Joseph Wallace, M. A., Past and Present of the City of Springfield and Sangamon County, Illinois. (Chicago, S. J. Clarke Publishing Co., 1904), Vol II, pages 1052ff (Biography of Joseph E. Burtle).

[16]_____; R. L. Polk and Co. Springfield City Directories, 1896-1924. (Various Springfield printers).

[17]Illinois State Journal, August 1, 1917,7.

[18]_____, May 5, 1925,12,14.

[19]Milo S. Ketchum, C.E., Structural Engineer's Handbook, (New York: McGraw-Hill, 1924), 139.

[20]_____, 243.

V. SOURCES CONSULTED

A. Books

Clark, Helen Hollandsworth, ed. A History of Fulton County, Illinois in Spoon River Country, 1818-1968. Astoria, Illinois: Stevens Publishing Co., 1969. (Early county history).

Cooper, James L. Iron Monuments to Distant Posterity. DePauw University, FHWA, Indiana Department of Highways and others, 1987. (Indiana's metal bridges, 1870-1930).

Darnell, Victor C. Directory of American Bridge Building Companies, 1840 - 1900. Washington, D.C.: Society for Industrial Archaeology, 1984. (An authoritative source book published by an affiliate of the Smithsonian Institution).

Ketchum, Milo S. C.E. Structural Engineers Handbook, 3rd ed. New York: McGraw-Hill, 1924. (An early classic on structure design, original edition 1914).

Miars, David H. A Century of Bridges. Clinton County (Ohio) Historical Society, 1972. (Early bridge development).

Plowden, David. Bridges: The Spans of North America. New York: Viking Press, 1974. (An overview and illustrated history of the advancement and romance of bridge building).

Polk, R. L. and Co. Springfield City Directories, 1896-1924. Springfield, various printers.

Wallace, Joseph, M. A. Past and Present of the City of Springfield and Sangamon County, Illinois. Chicago: S. J. Clarke Publishing Co., 1904. (Biography of Joseph E. Burtle).

B. Pamphlet

Ramblin Thru Spoon River Country. Publications Committee of the Spoon River Scenic Drive Associates, Canton Daily Ledger, 1969. (Spoon River fall color tour guide book).

C. Newspapers

Canton Daily Register, Canton, Illinois.
Cuba Journal, Cuba, Illinois:
Illinois State Journal, Springfield, Illinois
Lewistown Evening Record, Lewistown, Illinois

D. Reports

Historic Bridges Survey, Springield: Illinois Department of Transportation, Bureau of Design and Enviroment, 1992.

E. Maps

Atlas Map of Fulton County, Davenport, Iowa: Andreas, Lyter and Co., 1871.

Map Showing Marked Through Routes In Illinois, Springfield: Illinois State Highway Department, 1 February 1917.

Map Showing Construction Progress On Federal Aid And State Bond Issue Routes, Springfield: Division of Highways, Bureau of Design, 31 December, 1923.

F. Conversations

Ella Bolon
999 W. Locust
Canton, Illinois 61520
Telephone (309) 647-6221; November 24, 1992, June 11, 1993
(Former Buckeye resident, area historian).

Marjorie Bordner
Fulton County Historical and Genealogical Society
45 North Park Drive
Canton, Illinois 61520
Telephone (309) 647-0771; November 23, 1992, July 20, 1993.

Robert Ford
Rt. 1, Box 48
Smithfield, Illinois 61477
Telephone (309) 293-2861; November 24, 1992, June 11, 1993
(Buckeye resident, farmer, local historian, shared measurements).

Mrs. Fred S. Frank
950 Hoechester Road
Springfield, Illinois 62707
Telephone (217) 529-1323; October 4, 1993; May 2, 1994
(Descendant of Jerome Burtle).

Joe Helle
P.O. Box 245
Cuba, Illinois 61427
Telephone (309) 785-5041; July 20, 1993
(Former neighborhood resident).

Robert E. Pedigo
Fulton County Engineer
Bob Helle, Assistant
430 Oak, P.O. Box 492
Canton, Illinois 61520
Telephone (309) 647-0351; November 23, 1992, July 23, 1993.

Mrs. Helen Wright
122 West Chapin Street
Litchfield, Illinois 62056
(Fulton County ferry historian, correspondence August 11, 1993)

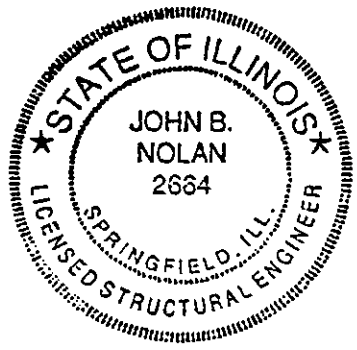
Mary Ruth Wright
Cass Township Supervisor
Smithfield, Illinois 61477
Telephone (309) 783-4431; July 20, 1993
(Conversation with Mr. Clayton Wright, husband).

VI PROJECT STATEMENT

This Historic American Engineering Record (HAER) report for the White's Ferry Bridge is part of a long term program to document historically significant structures scheduled for replacement. Older truss bridges are representative of state-of-the-art construction of earlier periods and provide a record of area needs and technology development at a point in time.

Preparation of this report was directed by the Bureau of Design and Environment of the Illinois Department of Transportation. Field measurements, member descriptions, technical and historical research and writing were by John B. Nolan, licensed Structural Engineer in Illinois. Maxine P. Nolan assisted in the editing and word processing. Archival photography was by Roger McCredie, Staff Photographer, I.D.O.T. Office of Public Affairs. Jerome Jacobson, Historic Resources Coordinator, Bureau of Design and Environment, was Project Supervisor.

John B. Nolan, S.E.
66 Circle Drive
Springfield, IL 62703-4805
May 12, 1994



APPENDIX

BRIDGE TRUSS DRAWINGS

Figure 1. Diagrammatic sketch of a Through Pratt Truss Highway Bridge. Nomenclature is generally similar to descriptions used in the White's Ferry Bridge report.[19]

Steel Highway Bridges.

Definition.—A truss is a framework composed of individual members so fastened together that loads applied at the joints produce only direct tension or compression. The triangle is the only geometrical figure in which the form is changed only by changing the lengths of the sides. In its simplest form every truss is a triangle or a combination of triangles. The members of the truss are either fastened together with pins, pin-connected, or with plates and rivets, riveted.

Types of Truss Bridges.—The bridge in Fig. 1 consists of two vertical trusses which carry the floor and the load; of two horizontal trusses in the planes of the top and bottom chords, respectively, which carry the horizontal wind load along the bridge, and of cross-bracing in the planes of the end-posts, called portals, and in the planes of the intermediate posts, called sway bracing.

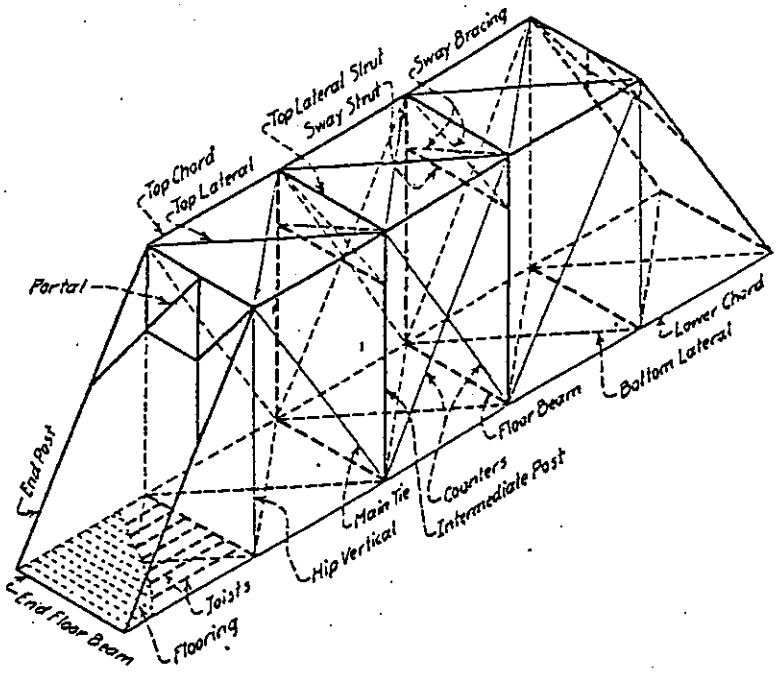


Fig. 1. Diagrammatic Sketch of a Through Pratt Truss Highway Bridge.

The floor is carried on joists or stringers placed parallel to the length of the bridge, and which are supported in turn by the floorbeams. The names of the different parts of the bridge are shown in Fig. 1. The main ties, hip verticals, counters and intermediate posts are together called "webs." The bridge shown in Fig. 1, is a through pin-connected highway bridge of the Pratt type, the traffic passing through the bridge. In a deck bridge the roadway floor is carried on top of the main trusses. The bridge shown has square abutments; if the abutments are not at right

Figure 2. Elevation drawing for a 200 foot span Truss Railway Bridge. A limited number of details in this Parker Through Truss are similar to the White's Ferry structure.[20]

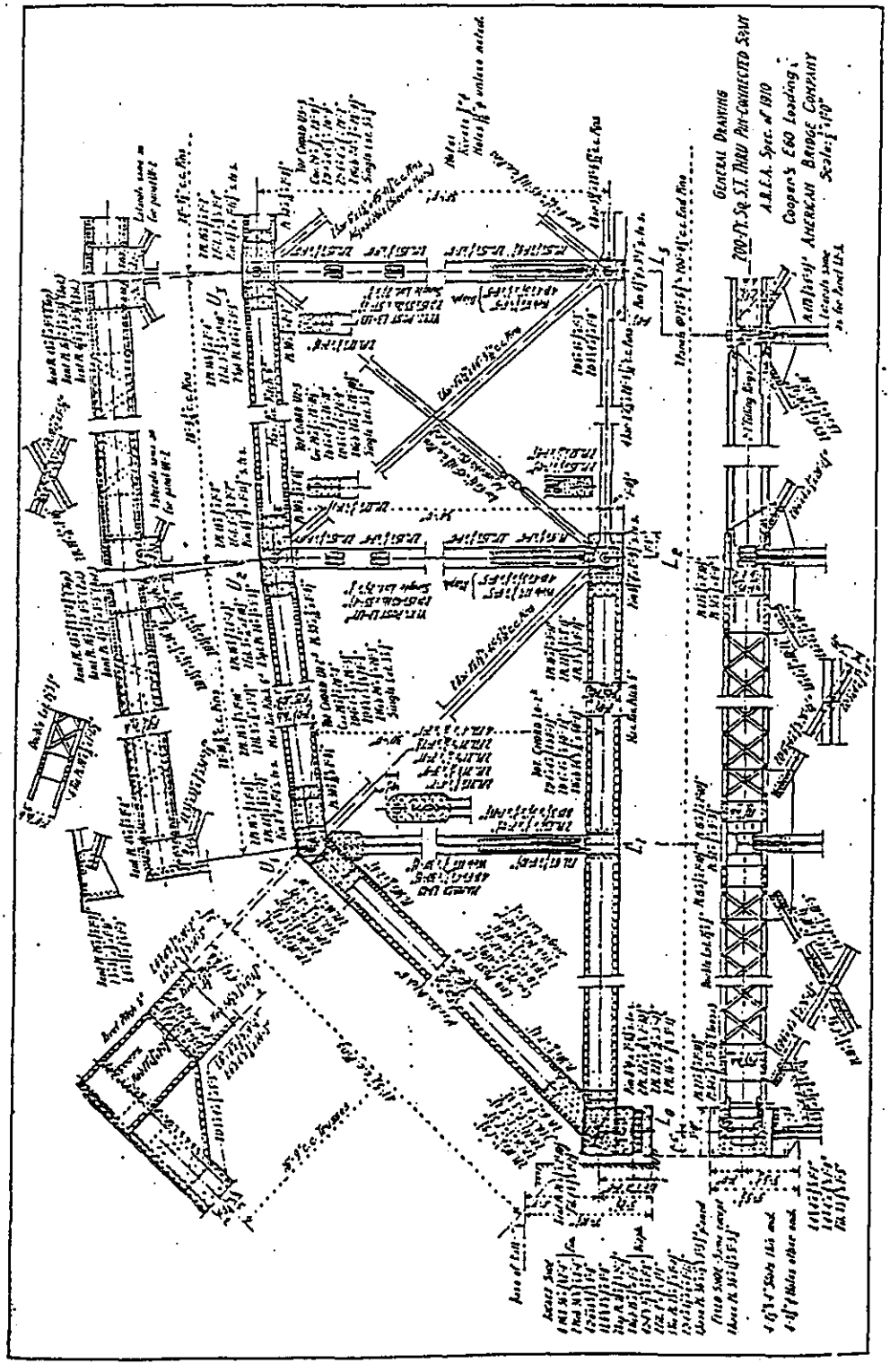


FIG. 42. DESIGN FOR 200 FT. SPAN TRUSS RAILWAY BRIDGE.